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ABSTRACT

The long-term stability of verbal and nonverbal IQ scores was studied for 146 Spanish-surname students. About 30-50% of Spanish students do no speak English when they begin school. The California Test of Mental Maturity or the Lorge-Thorndike Intelligence Tests were administered in grades 1,2,4,7,9, and 11. The stability of IQ scores for Spanish-surname students is highly similar to the stability pattern of a representative group of about 4,000 students from the school district. Verbal IQs at grade 4 show a high relationship with subsequent scores for Spanish-surname students. Changes in nonverbal scores are relatively small after grade 7 for both groups. Total IQs have a stability pattern similar to that of verbal scores for both groups, but the increase in nonverbal IQ from grades 4 to 7 is greater for Spanish speaking students. (Author/RS)

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Developmental Trends and Stability of Verbal and Nonverbal IQ Scores for Spanish-Surname Students

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The purpose of the present study is to investigate the long-term stability of verbal and nonverbal IQ scores for one substratum of the population, Spanish-surname students. Most students take several group intelligence tests during the K-12 school years, and inferences are made about their intellectual ability from these group tests. The long-term inferences about intelligence can be no more accurate than the degree of stability of the IQ scores.

In a recent analysis of IQ stability, the authors found that IQ scores from group tests are considerably less stable than Stanford-Binet IQs prior to grade seven (Hopkins and Bracht, 1972). In addition, verbal IQ scores were found to be much more stable than nonverbal IQ scores, especially prior to grade seven.

The question addressed by the present study is: "To what extent is the long-term IQ stability of Spanish-surname students similar to the stability of verbal and nonverbal IQ scores of the population?"

Paper presentation at the annual meeting of the American Educational Research Association, New Orleans, February, 1973.

Design of the Study

The population for our study of IQ stability has consisted of the entire student population for two graduating classes (grade twelve was completed by one class in 1969 and the other class in 1971) from a school district of approximately 30 schools and 20,000 enrollment in Boulder County, Colorado. This district's testing program has generally prescribed the administration of group intelligence tests in grades 1, 2, 4, 7, 9, and 11 for more than a decade. Sample sizes at grades 1 and 2 were too small for the Spanish-surname group to give meaningfully accurate stability data; hence the results at these grade levels are not reported. All testing was conducted in September or October.

Table 1 contains descriptive data for the two classes and the tests employed. The Lorge-Thorndike Intelligence Tests (LT), which were administered to all students in this study, provide a verbal IQ, nonverbal IQ, and total IQ. The scores for any student who was present for at least two of the testing periods were retained in the analysis.

Included in the study are 146 students with Spanish surnames. In this paper we are reporting the IQ stability for the Spanish-surname students and comparing the results to the total sample (N=446-2284 for various grade levels; see Hopkins and Bracht, 1972, for the results of the total sample).

Most of the Spanish-surname students live in a rural community in which about 30% of the school population is Spanish. Although most of the students are second- or third-generation residents of

the community, Spanish is the spoken language in 30-50% of the homes. Hence many of the Spanish students have little English facility when they begin school.

Developmental Trends of IQ Scores

The means and standard deviations of the verbal (V), nonverbal (NV), and total (T) IQ scores of Spanish-surname students in grades 4, 7, 9, and 11 are given in Table 2. It is apparent from the means in Table 2 that relative performance increased during the grade 4-11 sequence, especially for the nonverbal IQ scores. Figures 1 and 2 present the developmental trends for each of the 28 students who have a complete set of IQ scores for all four testings. The distributions of algebraic differences between successive testings (cf. Table 4) also provide information about the developmental changes in IQ scores. The increase in IQ means with successive testings may be a function of very large score increases by a few students; the smaller changes generally are balanced between increases and decreases. Large decreases in score generally do not occur except between grades 9 and 11.

Stability of IQ Scores

The stability (correlation) coefficients, given in Table 3, are based on the scores of all students in each pair of grade levels. For example, the correlation of .83 between fourth-grade and seventh-grade verbal IQ scores is based on the scores of the 44 students who have verbal scores for both grades.

The stability of the verbal IQ scores is generally quite high although the five-year and seven-year stability of fourth-grade scores is somewhat lower. The nonverbal stability coefficients definitely tend to be smaller than the verbal stability coefficients for the fourth-grade scores. However, there is no difference in the stability of verbal and nonverbal scores from grades seven and nine. By grade seven the scores show extremely high stability, approaching the theoretical maximum in view of the errors of measurement inherent in the tests. The total scores are moderately stable at grade four and display high lasting variance by grade seven.

Changes in IQ Scores

The changes in IQ scores are reported in Table 4 as the algebraic differences between scores at successive testings. In all cases the score of the second testing was subtracted from the score of the first testing to obtain the algebraic difference. The distribution of change scores is presented with the percentage of students in each interval. For example, 7% of the students with verbal scores in grades 4 and 7 have fourth-grade scores which are 10 to 19 points higher than their seventh-grade scores. The mean and the standard deviations of the algebraic differences are also reported in Table 4.

In addition to having the lowest stability, the fourth-grade nonverbal scores also change to a greater extent, primarily in the direction of higher scores in grade seven. Only 50% of the fourth-graders have changes of 10 points or less.

While most of the students (70-97%) have small changes (10

points or less) in verbal and total IQ scores, we must caution that a few students did have scores that changed by 20 or more points.

Comparison of Spanish-Surname Students to Total Sample

Due to the small sample sizes in grades 1 and 2, conclusions about the stability of IQ scores can be drawn only for grades 4, 7, and 9. This study of IQ stability for Spanish-surname students and the previous analysis of IQ scores for the total sample (Hopkins and Bracht, 1972) are the basis for the following conclusions:

1. Verbal IQs at grade four show a high relationship with subsequent scores both for Spanish-surname students (.66 to .83) and the total sample (.73 to .79). About 75% or more of the students have IQ changes of 10 or fewer points after grade four.
2. Nonverbal IQs at grade seven reflect about the same degree of stability as verbal IQs at grade four for both groups. There is considerable change in nonverbal scores in the elementary grades, but changes are relatively small after grade seven.
3. Total IQs have a pattern of stability which is generally similar to that of verbal scores for both Spanish-surname students and the total group.
4. The increase in nonverbal IQ from grade 4 to 7 is substantially greater for the Spanish-surname students than for the total sample.

Reference

Hopkins, K. D. and G. H. Bracht, Long-term Stability of Verbal and Nonverbal IQ Scores, 1972.

Table 1

Month and Year of Testing, Mean Age in Months at Time of Testing and Test Administered at Each Grade Level in Classes of '69 and '71

Grade	Class	Testing (Mo./Year)	Mean Age (in Mo.)	Test Used
4[a]	'71	9/62	114	LT, Form A, Level 3
7	'69	9/63	150	LT, Form A, Level 4
	'71	10/65	151	LT, Form A, Level 4
9	'69	9/65	174	LT, Form A, Level 5
	'71	10/67	175	LT, Form A, Level 5
11	'69	10/67	199	LT, Form B, Level 5
	'71	10/69	199	LT, Form B, Level 5

[a]Fourth-grade students in the class of '69 did not take the Lorge-Thorndike Intelligence Tests.

Table 2

Means and Standard Deviations of Verbal, Nonverbal, and Total IQ Scores for All Spanish-Surname Students Within Each Grade Level

Grade	Test	N		Verbal IQ	Nonverbal IQ	Total IQ
4	LT	58	$\bar{X}$	100.66	96.05	98.41
			s	15.03	16.07	13.48
7	LT	84	$\bar{X}$	103.45	103.89	103.67
			s	15.45	15.10	14.40
9	LT	76	$\bar{X}$	106.14	106.78	106.46
			s	15.01	17.02	14.69
11	LT	68	$\bar{X}$	103.76	108.00	105.87
			s	14.41	15.98	14.14

Table 3

Stability Coefficients of Verbal, Nonverbal, and Total IQ Scores for All Spanish-Surname Students within Each Pair of Grade Levels

Verbal IQ Scores[a]

Grade	7	9	11
4	.83 (44)	.69 (38)	.66 (32)
7		.92 (68)	.89 (58)
9			.85 (58)

Nonverbal IQ Scores

Grade	7	9	11
4	.47	.58	.46
7		.89	.81
9			.84

Total IQ Scores

Grade	7	9	11
4	.73	.70	.72
7		.94	.92
9			.92

[a]The numbers in parentheses represent the sample sizes of the corresponding stability coefficients for verbal, nonverbal, and total IQ scores.

Table 4

Percentage Distributions, Means, and Standard Deviations for Algebraic Differences between Verbal Nonverbal, and Total IQ Scores at Successive Testings for All Spanish-Surname Students in Each Pair of Grade Levels

	Verbal IQ Scores			Nonverbal IQ Scores			Total IQ Scores		
Interval	Grades 4-7	Grades 7-9	Grades 9-11	Grades 4-7	Grades 7-9	Grades 9-11	Grades 4-7	Grades 7-9	Grades 9-11
20 to 29	0	0	3	7	0	0	0	0	0
10 to 19	7	2	21	2	4	19	7	0	10
0 to 9	40	49	47	17	34	35	29	41	60
-10 to -1	37	38	28	33	41	36	41	56	29
-20 to -11	14	10	2	21	19	10	19	3	0
-30 to -21	2	2	0	5	2	0	2	0	0
-40 to -31	0	0	0	14	0	0	2	0	0
$\bar{X}$	-1.93	-1.72	3.81	-8.40	-3.00	.36	-4.93	-2.37	2.14
S	8.80	6.36	7.74	15.33	7.51	8.97	9.49	4.82	5.52
N	43	68	58	42	68	58	42	68	58

Note: The algebraic difference was computed by subtacting the later score from the earlier score, e.g., the seventh-grade score was subtracted from the fourth-grade score. Hence a negative difference means that the later score was higher than the earlier one.

Figure 2. Developmental Trends in Nonverbal IQ Scores for Students with a Complete Set of Scores in Grades 4, 7, 9, and 11. N=27

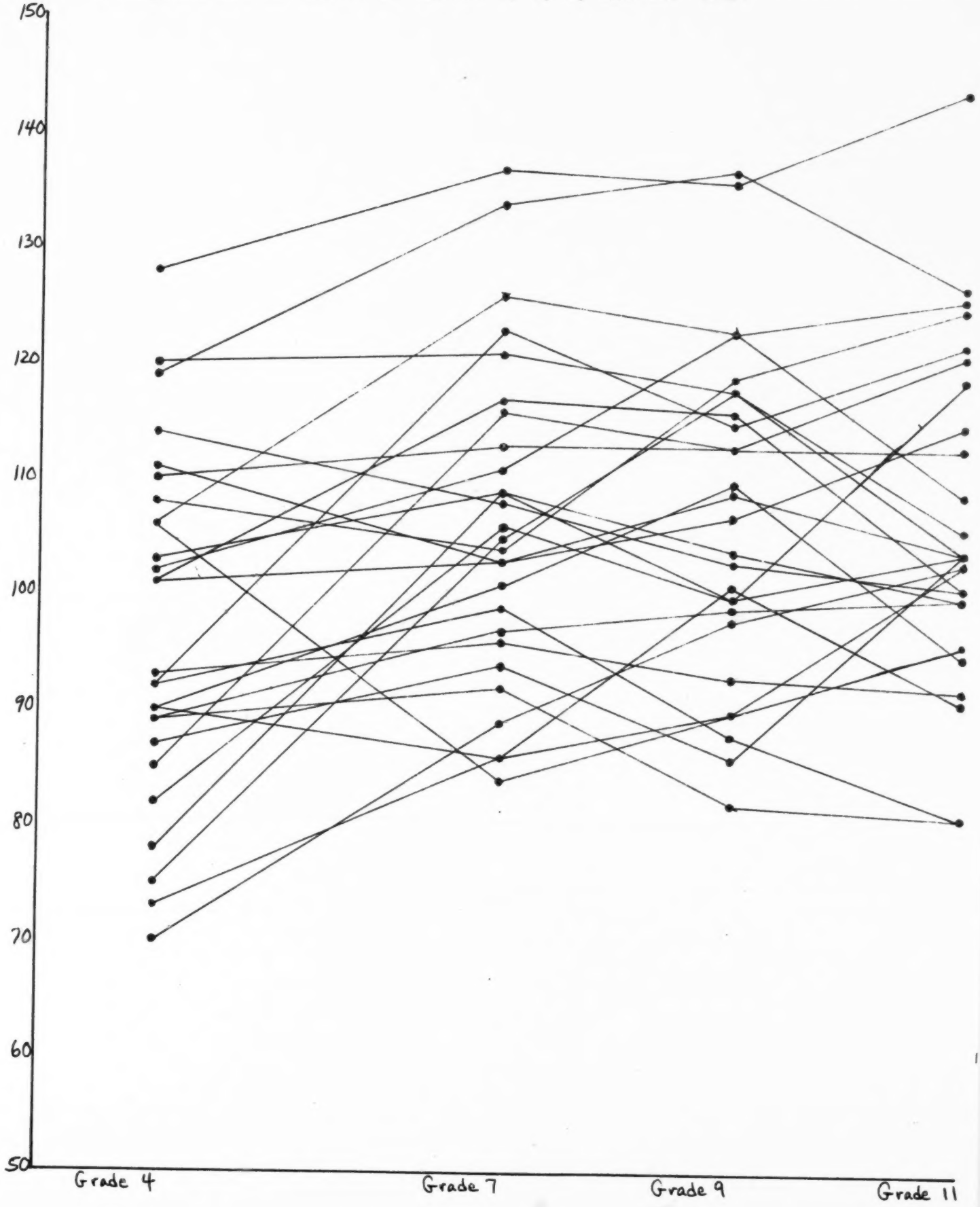

Figure 1. Developmental Trends in Verbal IQ Scores for Students with a Complete Set of Scores in Grades 4, 7, 9, and 11. N=28